

CLAIMS

1 A method for spatial up-scaling of an original video frame comprising p rows
and q columns of pixels, where p and q are integers, said up-scaling method comprising the
5 steps of:

- high-pass filtering the original video frame, considered as a low-low spatial frequency
subband (LL), in horizontal, vertical, and both directions, to construct high-low (HL), low-
high (LH), and high-high (HH) virtual spatial frequency subbands comprising p rows and q
columns of pixels, respectively,

10 - applying an inverse wavelet transform (IWT) to the constructed subbands and to the
original video frame so that an up-sampled version of the original image is obtained.

2 A method as claimed in claim 1, wherein the high-pass filter that is used for
the construction step is derived from a low-pass filter used for the inverse wavelet transform.

15 3 A method as claimed in claim 1, comprising a step of normalizing the pixel
values of the original video frame by a normalization factor before the construction step, said
normalization factor being derived from coefficients of the inverse wavelet transform filters.

20 4 A method as claimed in claim 1, wherein the step of constructing the high-
frequency subbands comprises a sub-step of shifting input samples of the original video
frame, a sub-step of predicting samples from the input samples using a prediction function,
and a sub-step of computing high-frequency coefficients of a subband on the basis of the
shifted samples and of the predicted samples.

25 5 A method as claimed in claim 1, wherein the step of constructing the high-
high spatial frequency subband is adapted to use a null filter, resulting in a subband filled
with zeros.

30 6 A method as claimed in claim 1, wherein the construction step and the inverse
wavelet transform step are iterated until a predetermined up-scaling factor is reached.

7 A device for spatial up-scaling of an original video frame comprising p rows
and q columns of pixels, where p and q are integers, said up-scaling device comprising:

- means for high-pass filtering the original video frame, considered as a low-low spatial frequency subband (LL), in horizontal, vertical, and both directions, in order to construct high-low (HL), low-high (LH), and high-high (HH) spatial frequency subbands comprising p rows and q columns of pixels, respectively,

5 - means for performing an inverse wavelet transform (IWT) on the constructed subbands and on the original video frame so that an up-sampled version of the original image is obtained.

8 An apparatus for displaying video frames, said apparatus comprising an up-
10 scaling device as claimed in claim 7, which is adapted to provide an up-scaled video frame from an input video frame received by said apparatus.

9 A video decoding device for producing an output stream comprising decoded
video frames from an input stream comprising encoded video frames, said decoding device
15 comprising an up-scaling device as claimed in claim 7, which is adapted to provide an up-scaled video frame from a decoded video frame.

10 A computer program product comprising program instructions for
implementing, when said program is executed by a processor, a method as claimed in claim
20 1.